REMARKS

In the last Office Action, claims 1-4, 7, 8, 10, 13-17 and 21 were rejected under 35 U.S.C. §103 as unpatentable over Miyazawa in view of Sumihara for the reasons stated in the previous Office Action. Claims 5, 6 and 18-20 were rejected under 35 U.S.C. §103 as unpatentable over Miyazawa in view of Sumihara and combined with Sawayama for the reasons stated in the previous Office Action. Claims 11 and 12 were objected to as being dependent upon a rejected base claim and were otherwise indicated to be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

In accordance with this amendment, allowable dependent claim 12 has been rewritten in independent form to incorporate the subject matter of base claim 1 and intervening claim 11, thereby placing claim 12 in allowable form. Claim 11 has been canceled. Independent claims 1 and 13 have been amended to revise the "wherein" clauses in formal respects to more clearly delineate the invention.

The rewriting of allowable dependent claim 12 to independent form clearly does not raise a new issue. Similarly, the revising of the "wherein" clauses in claims 1 and 13 does not raise a new issue requiring further search or consideration. As revised, claims 1 and 13 recite the

"wherein" clauses in a more positive manner by reciting that the ultrasonic motor is constructed such that if certain components were formed of conductive materials, a current path would be established between the conductive member on which the ultrasonic motor is mounted and the electrode of the piezoelectric element, and that at least one of the components is formed of an insulating material to prevent the establishment of the current path without the need for an additional insulator between the conductive member and the ultrasonic motor. The amended "wherein" clauses are slightly differently worded than those in the rejected claims though contain the same limitations. As presently worded, the "wherein" clauses better particularly point out and distinctly claim the inventive subject matter and, as described below, better patentably avoid the prior art.

Applicants therefore respectfully request entry and consideration of this amendment, which is deemed warranted under the provisions of Patent Rule 116.

The present invention is directed to an apparatus utilizing an ultrasonic motor driven by a self-oscillation circuit, wherein the ultrasonic motor is uniquely constructed so as not to impose design restrictions on the apparatus in which is utilized.

As is well known in the art, it is commonplace to mount an electronic device on a conductive plate member which

functions as a lead wire for supplying current from a power supply to the electronic device. However, when an ultrasonic motor is mounted on such a conductive plate member, electrodes of the piezoelectric device of the ultrasonic motor are likely to be short-circuited through the conductive plate member so that stable driving of the ultrasonic motor becomes impossible. In the case where an ultrasonic motor utilizes a self-oscillation circuit as the driving circuit, it has been necessary to either form the conductive plate member of insulating material and provide other means to conduct current from the power supply to the ultrasonic motor or provide a separate insulating structure.

This is due to the fact that the major components of the ultrasonic motor are made of electrically conducting materials, as exemplified by the prior art references of record. Namely, the oscillating member, moving body and pressing mechanism of the ultrasonic motor are formed of conducting materials whereby a current path is established between at least one of the electrodes of the piezoelectric device and at least one of the terminals of the power supply, which makes it impossible to drive the ultrasonic motor unless measures are taken to electrically insulate the components of the motor from the conductive plate member which serves as a lead wire to the power supply. Thus it has been necessary to eliminate this current path by providing a

separate insulating structure. This solution, however, imposes undue restrictions on the composition and structure of the electronic device in which the ultrasonic motor is mounted and, in the case of very small electronic devices, space restrictions may preclude provision of a separate insulating structure making it impossible to mount an ultrasonic motor in such a small electronic device.

The present invention solves this problem in a simple yet effective manner and does so without imposing size or structural restrictions on the electronic device. In accordance with the invention, an ultrasonic motor is driven by a self-oscillation circuit, which is advantageous due to its small size and excellent frequency follow-up characteristics, and one or more components of the ultrasonic motor are made of insulating material or have insulating surfaces to prevent a current path from being established between the conductive plate member (which is connected to the power supply) and electrodes of the piezoelectric element of the ultrasonic motor. More particularly, one or more of the oscillating member, moving body and pressing mechanism of the ultrasonic motor are formed of an insulating material or formed with an insulating surface so that no additional insulating structure is needed to prevent a current path from existing between the conductive base plate and the piezoelectric element electrodes. As a consequence, it is

possible to realize an ultrasonic motor that does not impose structural restrictions on the electronic device in which is mounted.

Independent claims 1 and 13 recite an apparatus having a power supply for supplying power to an electrical device and a movable member driven by an ultrasonic motor, wherein the ultrasonic motor is mounted to a conductive member (base plate) through which a power supply current is passed from the power supply to the electrical device. The claims further recite that the ultrasonic motor comprises a piezoelectric element, a driving circuit cooperating with the piezoelectric element to form a self-oscillation circuit for driving the piezoelectric element, an oscillating member in contact with the piezoelectric element to undergo oscillation in response to vibration of the piezoelectric element, a moving body disposed on the oscillating member to undergo movement in response to oscillation of the oscillating member, and a pressing mechanism for urging the moving body against the oscillating member. Claims 1 and 13 further recite that the ultrasonic motor is constructed such that if the oscillating member, the pressing mechanism and the moving body were formed of conductive materials, a current path would be established between the conductive member on which the ultrasonic motor is mounted and an electrode of the piezoelectric element, and that at least one of the

oscillating member, the pressing mechanism and the moving body is formed of an insulating material to prevent establishment of the current path without the need for additional insulator between the conductive member and the ultrasonic motor. No similar apparatus is disclosed or suggested by the prior art references.

The primary reference to Miyazawa discloses in Fig. 44 an ultrasonic motor which, as noted by the Examiner, comprises an oscillating member 2-27, a conductive support member 4-27, a piezoelectric element 3-27, a moving body 1-27 and a pressing mechanism 9-27. The piezoelectric element 3-27 has on its underside electrodes 3a-27 which are electrically connected through an anisotropic conductor 46 to a circuit pattern 47a on an insulating substrate 47 disposed on the conductive support member 4-27. The anisotropic conductor 46 is comprised of rod-shaped conductors 46a separated by insulators 46b, and the rod-shaped conductors 46b provide a current path between the piezoelectric element electrodes 3a-27 and the circuit pattern 47a on the substrate 47. This exemplifies the prior art constructions in which a separate insulating structure in the form of the insulating substrate 47 is required rather than, as in the case of the present invention, forming one or more of the oscillating member, moving body or pressing mechanism of an insulating material or with an insulating surface so that no additional insulator is

needed to prevent a current path existing between the conductive support member and the electrode(s) of the piezoelectric element. More importantly, Miyazawa does not disclose forming at least one of the oscillating member 2-27, moving body 1-27 and pressing mechanism 9-27 of insulating material or with an insulating surface as required by independent claims 1 and 13.

With respect to the limitation that at least one of the oscillating member, moving body and pressing mechanism is formed of an insulating material or with an insulating surface, the Examiner has relied on Sumihara as disclosing a moving body (movable member) formed of fiber-reinforced resin material, and the Examiner has stated that it would have been obvious to one of ordinary skill in the art to modify the Miyazawa ultrasonic motor to make at least the moving body out of fiber-reinforced resin material as taught by Sumihara. Even assuming that such a modification would have been obvious, such a modified Miyazawa ultrasonic motor would not correspond to that required by the claims.

Firstly, Miyazawa does not disclose an ultrasonic motor constructed such that if the oscillating member 2-27, the pressing mechanism 9-27 and the moving body 1-27 were formed of conductive materials, a current path would be established between the conductive support member 4-27 and an electrode 3a-27 of the piezoelectric element 3-27, as required

by claims 1 and 13. In the Miyazawa ultrasonic motor, the oscillating member, the pressing mechanism and the moving body are formed of conductive materials though no current path is established between the conductive member on which the ultrasonic motor is mounted and an electrode of the piezoelectric element. This is due to the provision of the insulating substrate 47 and the insulators 46b which prevent the establishment of a current path between the conductive support member 4-27 and an electrode 3a-27 of the piezoelectric element 3-27.

Thus even if Miyazawa were modified in view of Sumihara in the manner proposed in the statement of rejection, the modified structure would not correspond to that recited in claims 1 and 13. Stated otherwise, even if the Miyazawa ultrasonic motor were modified to form the moving body 1-27 of insulating material as taught by Sumihara, the resulting structure would still have the insulating substrate 47 and the insulators 46b, which constitute an additional insulator between the conductive support member 4-27 and the ultrasonic motor, which is contrary to the express recitation in the claims of preventing "establishment of the current path <u>without the need for an additional insulator</u> between the conductive member and the ultrasonic motor". Therefore even if the references were modified as proposed in the statement of rejection, claims 1 and 13 still patentably distinguish over the modified structure.

Secondly, applicants again respectfully submit that the moving body disclosed by Sumihara, which is comprised of a carbon fiber reinforced resin composite material, is electrically conductive and does not constitute an insulating material. In all of the disclosed embodiments of Sumihara, the carbon fiber reinforced resin composite material is comprised of 30 wt.% carbon fiber and 70 wt.% resin, and this amount of carbon fiber certainly renders the composite material electrically conductive. Even at the low range of 5 wt.% carbon fiber content, the composite resin would still be electrically conductive.

For the foregoing reasons, independent claims 1 and 13 patentably distinguish over the combined teachings of the prior art.

All of the dependent claims depend, either directly or indirectly, on base claims 1 and 13 and are patentable over the prior art for at least the same reasons as are base claims 1 and 13.

In view of the foregoing, the application is now believed to be in allowable form. Accordingly, favorable reconsideration and entry of this amendment together with allowance of the claims are respectfully requested.

Respectfully submitted,

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